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ABSTRACT

In order to compare the differences in cognitions of experienced and beginning teachers, the perceptions of six experienced teachers, six student teachers, and six probationer teachers (in their first year of teaching after college training) were studied at various times during the course of a school year, using a variety of methods (interview, repertory grid techniques, and stimulated recall commentaries on parts of lessons involving interaction with individual pupils or small groups). The findings from this exploratory work suggest that teachers possess qualitatively different types of information about pupils. Some types of information appear to be more useful to teachers in some contexts than others, although different types of information are often combined to guide their classroom actions. Teachers' perceptions can be classified into four major categories: (1) knowledge about pupils in general; (2) general knowledge about particular pupils; (3) specific knowledge about pupils; and (4) knowledge related to diagnostic/remediation routines. When comparing experienced teachers' knowledge with that of student teachers and probationer teachers, it seems that beginning teachers start out with very little of any of these types of knowledge. The type of knowledge that student and probationer teachers acquired most rapidly was general knowledge about particular children. (JM)

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# RESEARCH INTO TEACHERS' AND STUDENT TEACHERS' COGNITIONS:

## EXPLORING THE NATURE OF CLASSROOM PRACTICE

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The aim of this paper is to explain the rationale for a series of studies investigating teachers' and student teachers' cognitions, to review some of the substantive findings arising from the research, and to raise some related methodological and theoretical issues for discussion.

In research on teaching, teachers have been viewed as fulfilling a central, controlling function within a classroom environment which is complex and potentially unpredictable. It is contended that in order to carry out this function teachers develop conceptual structures, or ways of understanding their environment, which enable them to tune in to significant cues, to interpret their environment meaningfully, to predict future courses of events, and to determine their own actions and influences upon these. Such a model of teaching emphasises the role of teachers' cognitions in the process of teaching. Teachers' perceptions, conceptual structures, thoughts, judgements and decisions become essential elements for study in understanding what teachers do.

A cognitive model of teaching has guided enquiry into a number of specific educational problem areas: how teachers' thinking about the curriculum determines the translation of curriculum ideals and principles into classroom practice and the implications of such processes for curriculum innovation and implementation (e.g. Olson, 1980); how teachers' thinking guides their actions in the classroom, how these actions are interpreted by pupils and whether and how these ultimately influence pupil learning (e.g. Winne & Marx, 1982; how teachers' thoughts and consequent actions have come to be influenced by the ideological and physical context in which they work (e.g. Fray, 1983).

The main interest in the research reported here has been with the differences in the cognitions of experienced and beginning teachers, the aim being to acquire a fuller appreciation of the nature and development of teachers' classroom practice, and of its possible implications for teacher training.

When student teachers observe experienced teachers in the classroom, or observe videotapes of classroom interaction, they often display a limited understanding of classroom processes. In the writer"s experience, students' attention is often attracted by cues which are regarded by more experienced teachers as relatively superficial, abstract, or even irrelevant to the processes of teaching and learning. Early in their training, students typically report noting such features as the teacher's general tone of voice, the noise level within the classroom, and the apparent relationships between teacher and pupils. Rarely, however, do they take detailed note of the nature and demands of the tasks given to the pupils, the appropriateness of these tasks, or the teacher's expectations of the children in terms of achievement or classroom behaviour, unless they are explicitly directed to do so. In comparing the comments of experienced teachers and beginning teachers on videotapes of teaching, in comparing their reported reactions to common classroom critical incidents, and in comparing their comments in discussions of their own practice, there is a marked difference in the nature and sophistication of their interpretation and understanding of classroom events (Calderhead, 1981 & in press). Beginning teachers appear to lack the conceptual structures, or have simple, undifferentiated structures, with which to make sense of classroom life, and do not extract the same kind or level of meaning as experienced teachers.

It has been argued that the use of microteaching and skills study packages in the training of teachers helps to tune the novice in to cues which enable them to understand classroom processes more fully and/or reflect upon their own practices more critically (e.g. MacLeod & McIntyre,1977). However, it is questionable whether some of the procedures currently adopted in this area of training in fact help students acquire the necessary conceptual structures. Observation schedules, for example, are frequently used to structure students' observations of other teachers. Yet these schedules have often been designed for research rather than training purposes and may be of little value in sensitising students to the most relevant cues, from the point of view of

understanding observed practice. The use of FIAC, for example, may serve to make students aware of such features as the amount of time teachers spend talking in comparison with pupils, and the proportions of time spent by teachers in questioning, lecturing, etc., but seems highly unlikely to sensitise student teachers to the instructional and managerial strategies and routines that teachers employ.

Guides intended to help student teachers develop particular classroom skills often prescribe practices which do not well match those of experienced teachers. It may on occasion be desirable that new teachers are not encouraged to replicate existing practice, but develop new skills. However, if instruction in classroom skills bears little resemblance to what students observe within classrooms, and to what they are often called upon to do themselves, it may well be limited in its practical effects. Guides on teacher questioning, for example, often encourage students to differentiate questions in terms of their cognitive demands, using analytically derived taxonomies (e.g. Cohen & Manion, 1977; Kerry, 1982). Whilst learning such discriminations may well be useful to teachers, stimulated recall commentaries from experienced teachers suggest that their questions serve a variety of instructional and managerial functions, and that in their questioning of pupils, they attend to various cues other than cognitive demand. The following functions, for example, have frequently been found in experienced teachers' comments upon their questions:

Pacing - questions ensured of a rapid response (either because they are 'easy' questions or they are addressed to a child especially able to respond) designed to maintain the pace of teacher-pupil interaction.

Checking Understanding - questions which serve to assess or monitor the performance of particular pupils or groups or of the whole class.

Balance - questions which aim to distribute the teacher-pupil interactions more evenly around the class, involving all children.

Cueing - questions whose main function is to alert pupils to particular aspects of information in the lesson (as in working through a series of stages in the

solution of a problem).

Attention - questions which serve to redirect children's attention to the lesson or current activity.

During periods of questioning or 'recitation', teachers can be engaging in a skilful co-ordination of interests, asking questions which serve different and sometimes multiple functions. One question may be asked in such a way as to lead pupils to a quick response but it may be addressed to a particular child in order to regain his wandering attention. Another may be addressed to a child because he hasn't recently been involved in interaction with the teacher, yet may also serve the function of checking his understanding of the work in progress. Stimulated recall commentaries of primary school teachers upon their discussions with pupils at the beginning of creative writing lessons suggest that, in this phase of the lesson, some teachers are attentive to a variety of cues such as eye contact, pupil enthusiasm (reflected in hand raising and facial expression) and the continuity and development of pupils' ideas, all of which guide the teachers' actions in questioning (Calderhead,1982). On some occasions, periods of questioning serve to instruct, control, pace, motivate and even amuse the children.

Observation of teachers, using such instruments as FIAC, may indicate the frequency and intensity of periods of questioning, and teacher guides may encourage student teachers to think about such features as the demands of their questions, but for beginning teachers to understand what teachers are doing during these periods and to appreciate the information and concerns that guide their actions, requires consideration of teachers' cognitions. Research on teachers' cognitions would seem to have a valuable contribution to make to the development of relevant, effective training experiences for teachers.

In stimulated recall commentaries it has been found that teachers often report cues about pupils as being influential in determining their teaching actions.

This finding has stimulated further investigation of the information primary school teachers have about their pupils and how this is used in daily teaching. The perceptions of 6 experienced teachers, 6 student teachers and 6 probationer teachers (in their first year of teaching after college training) were studied at various times during the course of a school year, using a variety of methods (interview, repertory grid techniques, stimulated recall commentaries on parts of lessons involving interaction with individual pupils or small groups). The findings from this exploratory work suggest that teachers possess qualitatively different types of information about pupils. Some types of information appear to be more useful to teachers in some contexts than others, although different types of information are often combined to guide their classroom actions. Teachers' perceptions could be classified into four main categories, as follows.

Knowledge about pupils in general Experienced teachers in particular appear to have amassed a large quantity of knowledge about children in general. Teachers who have taught the same age-range of children, in the same school, with probably the same curriculum for several years, have acquired a great deal of useful information. They know the kinds of home backgrounds the children have (after teaching older brothers or sisters, they sometimes even know the families). They know the kinds of experiences the children tend to have had prior to school, and the kinds of activities the children engage in outside school. Teachers of older classes also know the learning experiences that the pupils are likely to have had earlier in their school careers. Knowledge about pupils in general seems to help teachers a great deal at the beginning of the year before they get to know their class more personally. Experienced teachers in a sense already 'know' their new class even before they meet them. They have an idea of the range of knowledge and skills to expect in their class, the likely number of children who will need special help, and the type of attitudes, misbehaviours and discipline problems there will be. Knowledge about pupils in general also figures, however, in some of the decisions and judgements made by teachers throughout the year. In particular, teachers' previous experiences with similar pupils in similar areas of the curriculum have attuned them to

common problems and difficulties that pupils experience and also to subject matter and materials that generally engender, or fail to engender, interest. Knowledge about pupils in general enables teachers to be well prepared to avoid or cope with these potential difficulties.

In an interview study of secondary school teachers involved in project work, Martin (1982) found teachers possessed 'stereotypical knowledge' about children's learning styles. Teachers spoke of the general approaches to work that different types of pupils had. Eight common stereotypes were elicited in the discussions, including the fitful plodder who "tries hard but still doesn't usually succeed, is very attentive to accuracy and neatness and can collect and recall facts but is unable to interpret them"; and the seasoned voyager who "does all things well, collects evidence selectively, builds arguments logically and critically and presents a rational, balanced piece of work." Similar stereotypes are sometimes evident in primary school teachers' comments about their pupils ("tries hard but never gets there") and may reflect another feature of teachers' conceptions of pupils in general.

General knowledge about particular pupils Teachers are quick to make certain general assessments of their pupils. Even after the first few days, experienced teachers seem able to comment about their new pupils - particularly in those areas well identified in research on teachers' perceptions: general ability, classroom behaviour and sociability (how well the pupils get on with the teacher and other children). Teachers reported using these kinds of assessments for grouping their pupils, for isolating "troublemakers" and also in interpreting the significance of much pupil behaviour in the classroom. For example, when children raise their hands to answer a question, teachers would sometimes have a good idea of who was likely to give a correct answer and who wasn't, based on general conceptions of the individual children's abilities. This could then determine who was called upon to answer (e.g. on occasions teachers would aim to boost the confidence of a low-ability child by providing the opportunity to

show in public that he can do it). Similarly, when a child makes a mistake in a written exercise, whether this is interpreted as an indication of carelessness, the work being too difficult, the child having an 'off day', the need for one or two brief hints or the need for a long individual session with the teacher is often determined not by the nature of the error itself but by the teacher's general assessment of the pupil concerned.

Specific knowledge about pupils On some occasions, teachers spoke at length about much more specific skills, behaviours, attitudes and areas of knowledge which they attributed to their pupils. Some teachers seemed able to express this knowledge of pupils more easily than others, and pupils who for some reason attracted teachers' attention - because of their outstanding ability or lack of it, for instance - were assessed in more detail than others. This area of knowledge encompassed such features as a child's ability to distinguish particular phonic blends and the difficulties he has with others; particular problems experienced in handwriting - co-ordination, joining up, or odd stylistic characteristics; the mathematical procedures that can be coped with or present difficulty; and a child's attitudes to work - whether enthusiastic about certain subjects, careless at others, etc. This area of knowledge covers a wide range of individual characteristics of the pupils.

Knowledge related to diagnostic/remediation routines Teachers also have knowledge about the precise difficulties that pupils might encounter in particular lessons, but these are often not associated directly with the pupils themselves. It seems that in doing a particular lesson or activity, teachers are attuned to a set of difficulties and have a repertoire of routines with which to respond to them. A teacher in a lesson on the division of fractions, for example, appeared to be ready to identify such problems as forgetting to invert the divisor, incorrectly changing mixed numbers to improper fractions, and errors in 'cancelling down'. This type of knowledge differs from others in that teachers did not appear to regard it in terms of attributes of their pupils. The knowledge

seems to sensitise teachers to difficulties that pupils might experience during a lesson, and often serves the function of directing a remedial routine, but is not necessarily linked to teachers' knowledge about the pupils involved. Knowledge related to diagnostic/remediation routines seems to be associated more with what Leinhardt (1982) refers to as "the agenda" of particular lessons or areas of work. One could speculate that this is because these are generally not very stable characteristics of pupils, and therefore it serves no useful function to associate them with the children.

In the case of experienced teachers, these different types of knowledge sometimes guide different types of action in the classroom, as indicated above. But they are also often combined to inform other decisions. For example, teachers' planning appears to be frequently influenced, whatever the time of year, by both knowledge of pupils in general and knowledge of particular pupils within the class (both specific and general). Teachers' reactions to pupils in the classroom often seem to call upon general knowledge of the pupil as well as knowledge of the specific difficulties involved and/or diagnostic/remediation routines.

When comparing experienced teachers' knowledge of pupils with that of student teachers on teaching practice and probationer teachers in their first year in schools, it seems that beginning teachers start out with very little of any of these types of knowledge. It is not difficult to find examples of classroom practice where this may well contribute to some of the beginning teachers' difficulties. Lesson planning at the beginning of the year, for example, may be hampered by the lack of knowledge concerning what the class might be expected to know, what they might be expected to do, and how they might respond to different activities. Beginning teachers might also take a long time learning to differentiate errors which signify carelessness as opposed to ignorance or attention-seeking. The task of anticipating the difficulties of their pupils could present many problems due to their lack of general knowledge about pupils' experiences with the curriculum. Classroom observation of the

teachers suggested that the student and probationer teachers were sometimes quite reactive in their classroom interaction compared with their more experienced colleagues - the beginning teacher, however, may have no option but to wait until the children make mistakes and then react to them, whereas experienced teachers might be able to anticipate pupil difficulties and take action to avoid them.

In this study the type of knowledge that student and probationer teachers acquired most rapidly was general knowledge about particular children. After the first three weeks of contact with a class, beginning teachers had formulated assessments of pupils' general abilities and classroom behaviour. Other types of knowledge appear to develop more slowly. The reason for the rapid assessment of general ability and classroom behaviour might be that these provide useful information in coping with the managerial and organisational difficulties that beginning teachers generally experience (identifying the potentially troublesome pupils, for instance).

The research reported here has been small-scale and exploratory in nature but it raises some substantive, methodological and theoretical issues.

Firstly, it seems likely that an awareness of the different types of knowledge that teachers have of their pupils and how these are used would aid students' understanding of teachers' practice, and help them to think about the development of their own - to consider, for example, the kinds of information they have to acquire and the kinds of discriminations they must learn to make in order to plan the lessons or employ the strategies/routines that they wish to. Exactly what form this should take in teacher training is an open question, but there would seem to be potential in further research and development work.

An important methodological issue arises from the research in that different research methods were found to pick out different types of knowledge. Repertory

compare one pupil or group with another, or non-focussed interviews (e.g. "Tell me about your pupils") tend to reveal general, decontextualised assessments (behaviour, ability, maturity, sociability) - a finding borne out in previous investigations using the same techniques (see Nash, 1973; Taylor, 1976; Wood & Napthali, 1975). Interviews focussed upon particular classroom actions or features of lesson planning (e.g. "Why did you.....?" or "Can you talk about what was happening when.....?") reveal different types of knowledge, ranging from specific attributes and teachers' routines to general knowledge about children (see also Morine-Dershimer, 1979).

Consequently, research which attempts to link teachers' perceptions of pupils to teachers' actions in the classroom may give an incomplete or even false account if it collects data through a method which only describes one type of knowledge. There are similar implications for policy capturing studies which aim to investigate how information about pupils influences teachers' judgements and decisions: teachers' reactions to a situation may be influenced by their general conceptions of pupils, their previous experiences with pupils or by their repertoire of teaching routines. Unless these aspects of teachers' cognitions are investigated, policy capturing studies on the effects of information about pupils may be describing some unrealistic relationships.

Lastly, research on teachers' perceptions has implications for the development of an adequate theoretical framework for understanding teachers' classroom practice. Obviously the nature of teachers' perceptions of pupils and their relationship to teachers' actions in the classroom are both complex. Our theoretical frameworks and our research must take account of this complexity.

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